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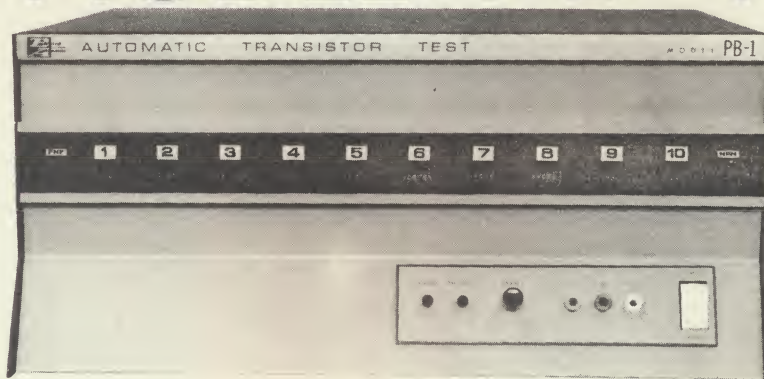
PUBLISHED QUARTERLY
VOLUME 6 NO. 2

IEEE SHOW ISSUE, MARCH 20-23

SEE AT THE
IEEE BOOTH
NO. 2C18

MODEL PB-1

MEASURES
DC PARAMETERS OF
NPN, PNP TRANSISTORS
AND OTHER
SEMICONDUCTOR DEVICES



AUTOMATIC TRANSISTOR TEST SET

**B
A**

BAIRD-ATOMIC

ELECTRONIC PRODUCTS AND COMPONENTS DIVISION

33 UNIVERSITY ROAD, CAMBRIDGE, MASSACHUSETTS 02138, Telephone: 617 864-7420

*See show-time special IEEE
Pocket Guide insert*



L & M associates, engineering representatives, incorporated
511 Victor Street, Saddle Brook, New Jersey 07662 • (201) 843-8700



AROUND THE CIRCUIT

Well, the Holiday season has come and gone, and we seem to be traveling toward the annual **IEEE Convention** like a sidewinder headed for **Marty Silver's** fat cigar. Every engineer visiting this convention is confronted with a virtual explosion of products, data, details, and other bewildering influences. To clarify this picture and give the **IEEE** visitor assistance in locating the most noteworthy items of interest, **L&M Associates, Engineering Representatives, Inc.** (Please note our new name - we are now incorporated) has prepared a short form directory which will help you gather the "Mostest" in the shortest time during the Show and guide you to the booth of each of the manufacturers which we represent. Tear out this center insert and tuck it in your coat pocket. Its designed to lead you to the best with the least mileage—and while you are there, don't forget to look us up at one of the booths. See you at the Show!

At the annual meeting of the Board of Directors held in January 1967, **Richard W. Seabury, Jr.**, was elected Chairman of the Board and

Edwin S. Seabury was elected President of **RFL Industries, Inc.** Note **Radio Frequency Laboratories, Inc.** new name **RFL Industries, Inc.**

L & M Associates are pleased to offer our congratulations and best wishes to the following people who recently joined **RFL Industries, Inc.**

Bill Jauch has joined the Instrument Division as specialist in Instrument Calibration Standards and Metrology Apparatus. He was formerly Manager of the Standards Section of **RCA, Somerville, N.J.**

Jim Meissner comes to **RFL** from **Julie Research Laboratories** and will specialize in the design of Metrology Instruments.

Channing Williams, formerly with **Hewlett Packard**, brings to **RFL** a wealth of solid-state circuitry knowledge which will be applied to the product development of instruments in all **RFL** divisions.

Alford Mfg. Co. has moved to new and larger quarters; conveniently located near Electronics Row on Route 128. **Mr. Andrew Alford**, President, proudly invites all to visit the new location at 120 Cross St., **Winchester, Mass.**

We are glad to welcome our old friend, **Gerry Cohen**, back to **Alford Mfg. Co.**, Boston, Mass. **Gerry** was with **Alford** as a cooperative **North-eastern University** student and re-



Edwin Seabury, President, RFL Industries, Inc.

ceived his B.S. degree in Electrical Engineering from that school in 1960. **Gerry** has been named Sales Engineer and will handle inside sales activities. We're looking forward to working with you, **Gerry!**

L & M Associates is pleased to announce its appointment as Engineering Sales Representative for **Micom, Inc.**, Palo Alto, California. Headed by General Manager, **John Ames**, **Micom** manufactures a high quality line of precision flutter and wow meters in the range from 3KHZ to 216KHZ. **Micom's** products are of prime importance to manufacturers and users of all types of data and audio recording and play-back equipment.



How a year can pass so quickly is inconceivable! We are just about recovering from the wear and tear of last year's fiasco, and here we are again ready for our ventures into "fun city". The pace at which this industry has been moving has resulted in considerably greater loss of hair and so we can't afford to go "topless" anymore. It's a good thing

the waitresses in N. Y. aren't in this business.

This past year has seen the integrated circuit (IC) come into its own as a tool for the design engineer, but with its use it has brought along the problems of test. Two of our principals have brought out equipment directly applicable to I.C.'s. **Quan-Tech's** 2283 is used to measure noise of linear IC amplifiers and indicates gain as a by-product.

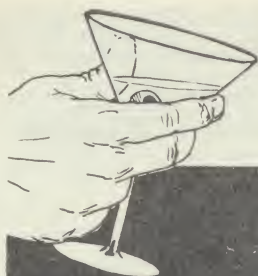


New Home of Alford Manufacturing Co. in Winchester, Mass.

This equipment will be displayed at **Booth No. 2D47** at the **IEEE. CDC** has produced a wide variety of measuring equipment to check DC & AC parameters of both linear and non-linear sections of IC's, both on the laboratory bench or in large production. In line with the great strides seen in solid-state applications, **Quan-Tech** also has the 311 and 312 FET noise test sets; and **Baird-Atomic's** 10-parameter PB-1 automatic test set is being used for SCR's and FET's. Visit **Baird at Booth No. 2C18**.

(Continued on page 7)

SEE AT THE IEEE BOOTH NO. 2D04



IF YOU WANT YOUR MARTINIS DRY
AND YOUR FREQUENCIES MODULATED...

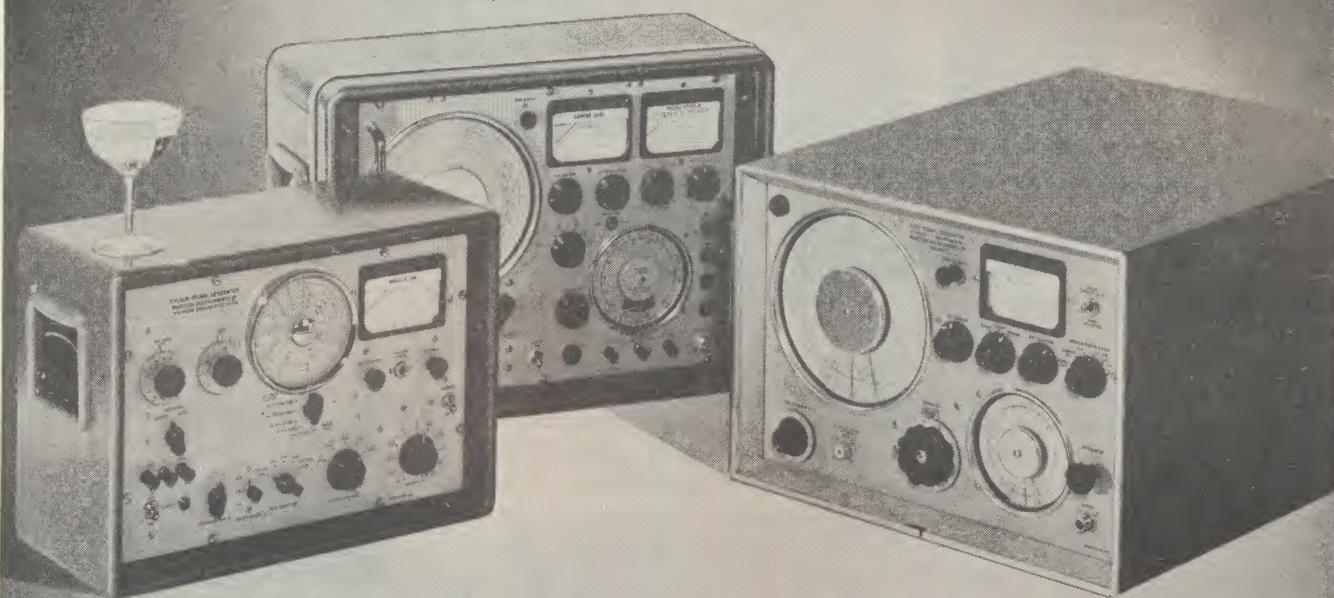
MARCONI SIGNAL GENERATORS

WILL SOLVE ONE OF YOUR PROBLEMS...

10MHz-470MHz

From fundamentals clean FM, high stability, low FM noise, electronic fine tune, for communications, telemetry, FM broadcast.

Model 1066B/Series.



1.5MHz-220MHz

A multiplier generator used in FM/AM broadcast, stereo and FM/AM communications, wide range, good AM and FM.

Model 995A/Series.

470MHz-960MHz

A tuned line covers channels 14 thru 83 for FM sound, also telemetry, with FM deviation to $\pm 300\text{KHz}$, mod. rates to 100KHz.

Model 1060/3.

A taste for dry martinis makes friends...so do these Marconi Signal Generators make friends. Some of the reasons are listed in these specs.; most of the reasons are listed in the literature. Write for it today.

MARCONI

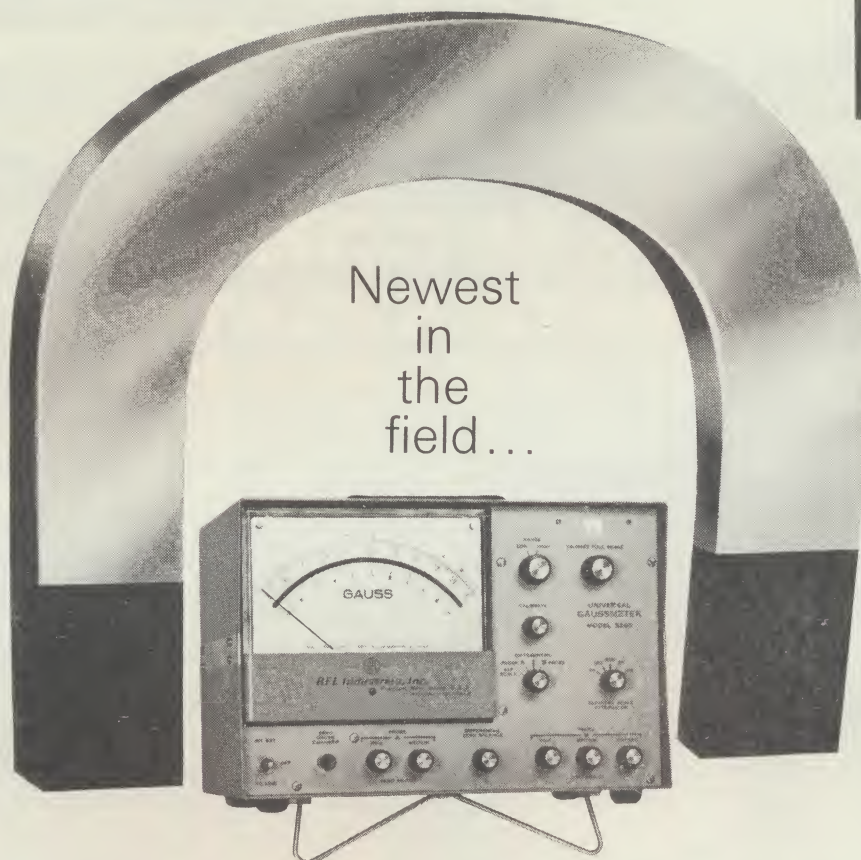
INSTRUMENTS

111 Cedar Lane • Englewood, N. J.

Division of English Electric Corporation

Telephone: 201-567-0607

SEE AT THE
IEEE BOOTH
NO. 2A35



Newest
in
the
field...

RFL Model 3265 Gaussmeter

3 Modes of Magnetic Measurement: Absolute, Differential, Incremental

The Model 3265 is a precision Hall-effect gaussmeter capable of three distinct modes of operation: measurement of absolute flux densities from .02 gauss to 50 kilogauss (DC and AC to 400 Hz). Incremental determination of field variations to a resolution of 1 ppm as an expanded scale gaussmeter and a differential mode enabling simultaneous measurement of two separate fields or single field gradients.

All solid-state design provides highly stable operation for laboratory, production line or portable field use. The large seven-inch taut-band meter allows precision measurements with ease of readability.

An accessory DVM may be used for true Digital gaussmeter operation.

Phone Herb Brumbach (201) 334-3100 for engineering evaluation loan or demonstration without obligation — or write for detailed specifications.



Complete range of Hall-effect probes for transverse, axial and tangential fields.



RFL Industries, Inc.

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IEEE Booth No. 2A35 This Voucher Redeemable for One Pair

FLEXIBLE VINYL/BARIUM FERRITE PERMANENT MAGNETS

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ADDRESS _____

CITY _____ STATE _____ ZIP _____

Magnetized for you by RFL INDUSTRIES, INC.





"SOLDERING" TALK

As most of you are aware, there is a trend toward reflow soldering of integrated circuit leads. This does not mean that parallel-gap welding is being obsoleted, but our evaluation indicates more and more users of flat packs are looking at soldering.

1. P/C Boards
 - a. 2 Ounces Copper
 - b. Solder Coated (63/37)
 - c. Electro Solder Plate or Hydro Squeegee, thickness, .022" minimum

2. Flat Pack Leads

a. Leads should be preformed for rigidity as well as better concentration of heat.

b. Tinned leads (with flux), 2 seconds in 63/37 solder at 500° F.

It should be noted the above conditions produced satisfactory results. This does not mean that other combinations will not produce equally good results.

The one problem area we are faced with most is the lack of solder. There cannot be a good "fillet" when inadequate solder depositions are evident. A simple comparison is to visualize the solder as glue. A weak joint will result if the minimum quantity is not in the joint.

In general, we have **not** found acceptable solder connection without the use of flux. The one general rule for flux is; the more activated, the less heat required to liquify the solder. In other words, alcohol can be used, but a more active flux such as Alpha 711 or Gardiner GF 2,000 would give much better results.

Solder's attraction for many is its ease of inspectability. If a bright, smooth joint can be achieved with good "filleting", the chances are excellent for a good solder joint. Repairability is of course, the other big attraction.

The presence of gold in the solder fillet is undesirable. When gold plated P/C circuits are used, less strength will be noticed. Extremely long heating cycle will continue the etching of gold, increasing the gold in the solder. Pretinning of the leads should be so timed to allow some etching of the gold and to be diluted in the solder pot. See a demonstration at **Booth No. 3A 48. Hughes Aircraft Co.**

SEE AT THE IEEE BOOTH NO. 3C14

PROXIMITY VOLTMETERS



Series 5050 Proximity Voltmeters provide a new dimension in voltage measurement. Exclusive Victoreen Dynamic Capacitor Detector Probes allow non-contacting voltage measurement from 1 volt to 3000 volts fullscale. Accuracies of better than 1% can be achieved. 100% feedback operation provides maximum insensitivity to variations in spacing between probe and surface.

FEATURES

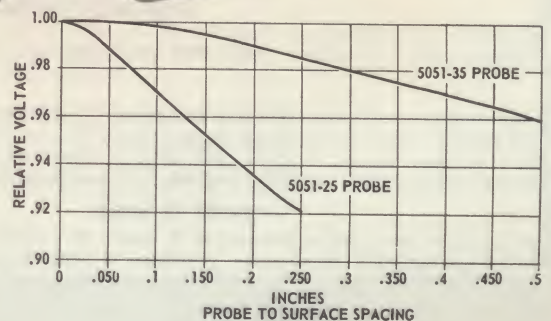
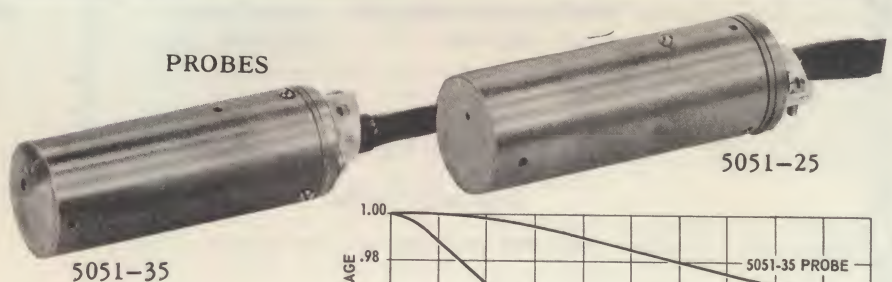
- Small Non-Contacting Probe
- Dynamic Capacitor Detection
- Unequalled Resolution and Sensitivity
- Fast Response
- Low Noise Brushless Probe Design
- Solid State Construction

MEASURES

- Contact Potential of Metals
- Surface Potentials on Plastics, Paper, Fabrics, Semiconductors; in fact, any Insulating or Conducting Materials
- Surface Potential Distribution
- Accumulation Rate and Total Electrostatic Charge

DYNAMIC CAPACITOR PROBES

PROBES



THE VICTOREEN INSTRUMENT COMPANY

10101 Woodland Avenue, Cleveland, Ohio 44104

Hungry for automatic test sets?

Whether you want a snack or a gourmet dinner,

go SCAT 26 - by Continental Device Corporation

Complete Dinners

SCAT 26

3 lead - 20 tests load line go-no-go printed card program \$12,000

SCAT 26

3 lead - 20 tests load line go-no-go IBM card program \$17,650

SCAT 26

14 lead - unlim tests tape program, single limit 4 digit data \$16,200

SCAT 26

14 lead - 40 tests load line go-no-go peg board program \$26,650

SCAT 26

14 lead - 20 tests printed card program single limit, 4 digit data \$18,600

SCAT 26

14 lead - unlim tests tape program, dual limit 4 digit printer \$18,150

A La Carte

Interconnections (choose 1)

3 lead test

14 lead test

48 lead test

Test Capability (choose 1)

1-20 tests, solid state logic

1-40 tests, solid state logic

1-60 tests, solid state logic

unlimited tests, data or go logic

Programming Input (choose 1)

printed circuit card IBM card

manual peg board optical tape

direct dial pot magnetic disc

Test Method (choose 1 or more)

Load line, 300V, 0.5A

Forced Function, prog. 0-20V, 100ma

Forced function, prog. 0-35V, 100ma

Forced function, prog. 0-250V, 50ma

Forced function, prog. 0-150ma, 20V

Accessories and Output Equipment

(choose as many as you wish)

Multiplex queing stations

Test lights

Bin lights (10 matrix lev)

Lo-go-hi 2 limits

Bin selector

Tape perforator

A- D converter

Bin counter

IBM card punch

IBM typewriter

Tape printer

Test counter

After Dinner Snacks

ARE AVAILABLE AT ANY TIME,
ALSO COMPLETE DINNERS
TO YOUR ORDER!

(For additional details consult the
maitre d', your L&M engineer)

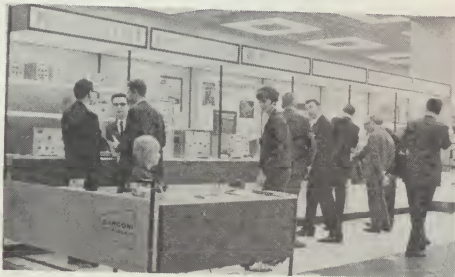


Continental Device Corporation

12515 Chadron Avenue, Hawthorne, California • SPring 2-4551

DISCU-TECH (Continued from page 2)

Measurement of solid-state devices may be one matter, getting them on to a circuit board is another. **Hughes** has had tremendous success with the MCW systems in both welding and soldering discrete components and complete packages to mother circuit boards, as well as internal lead connection within the devices. And since these items are getting smaller and harder to handle, **Hughes** is now supplying the interface handling and positioning equipment. Complete setup will be operating at **Booth No. 3A48**.



Remember last year - Marconi Instruments Booth IEEE 1966 - Let's fill it up even more this year.

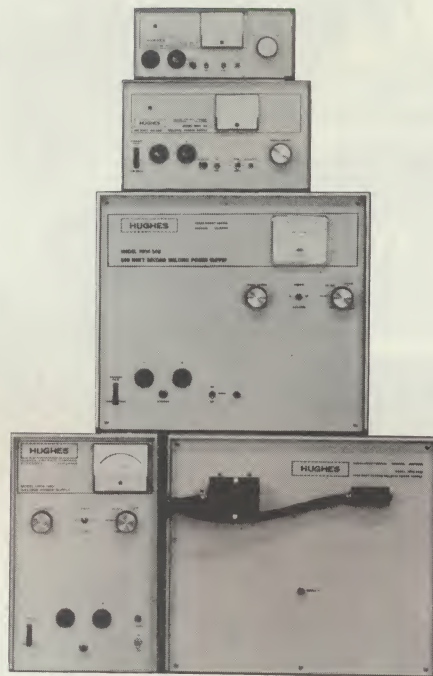
In keeping with our modern-day trends of "go now, pay later", **Vic-toreen** is getting more and more "charge customers". Of course, as with credit, charge can be good and bad. For electrostatic paper copy machines, the more the better, and you can tell how much with the EPA-825 paper analyzer; and in other cases, wanted or not, the **Victoreen** electrometers or the Series 5050 proximity voltmeters can tell the story. These equipments will be on exhibit at **Booth No. 3C14**.



Leon Seldin, L & M, N. J. (back to camera) Israel Lerner, Ft. Monmouth, N. J. and Brian Morris, Marconi Instruments, discussing the Marconi Model 2300 Deviation Meter.

The T.V. boys may not like to have a big tube staring at you, but **RFL** has made certain that you know you have a meter to look at. The new generation of gaussmeters has that "all meter, no knobs" look, which yields 0.1 gauss, single ended or differential, spread over 8 inches. Who said this was the age of miniaturization!! Come to **Booth No. 2A35**.

There is much to be seen at the show, so use the handy insert and "Come on over to the **L & M** side".



SEE AT THE
IEEE BOOTH
NO. 3A48

THE HRW SERIES WELDING POWER SUPPLIES and ACCESSORIES

The HRW series of capacitor discharge power supplies is designed for your most demanding production requirements. The series offers advanced all-solid-state circuitry, exceptionally fast recharge rates, and simplified component layout to assure you of long, trouble-free service.

As with all Hughes capacitor discharge power supplies, discharge is automatically locked out if the supply is not fully charged, thus assuring full weld energy every time—preventing partial welds. Another built-in feature to assure quality welds is the automatic recharge cycle. Some equipment does not start a recharge until the weld head is opened. This means that the operator's habits can delay the start of recharge. Hughes power supplies eliminate this production problem. All Hughes power supplies start their recharge for the next weld almost immediately, regardless of whether the weld head has been opened or its microswitch reset. After each weld, a very brief hold-off period is provided to assure that the capacitor bank is fully discharged. Thereupon, recharge starts automatically.

All units are voltage regulated and maintain consistent output with line changes of up to $\pm 10\%$.

The elimination of mechanical or mercury relays by the use of silicon control rectifiers provides greater freedom from noise, wear and service, plus economy and faster repetition rates. A sturdy, well ventilated, nickel plated chassis aids in heat dissipation. Where exceptionally fast duty cycles are required, forced air fans are optional on the HRW-50 and HRW-100 (standard on the HRW-250, HRW-500 and HRW-1000).

Models with dual or triple pulseform selection are available to meet the special requirements of certain jobs. This feature is standard on larger machines, available as noted on others.

The selection of the desired pulse is made by a front-panel selector switch. To aid in selecting and resetting exact watt-second settings, all units have extra large meter faces with dual range scales. A "set up" position is provided to prevent accidental discharge during set-up and during electrode maintenance.

As always, Hughes is the leader in engineering products with versatility and reliability. Repeatability, dependability, fast cycling, advanced styling and the latest design in charging circuitry is engineered into the HRW series. One of these supplies holds the answer to your welding problem. Let Hughes sales engineers' help you select the correct supply for your job.

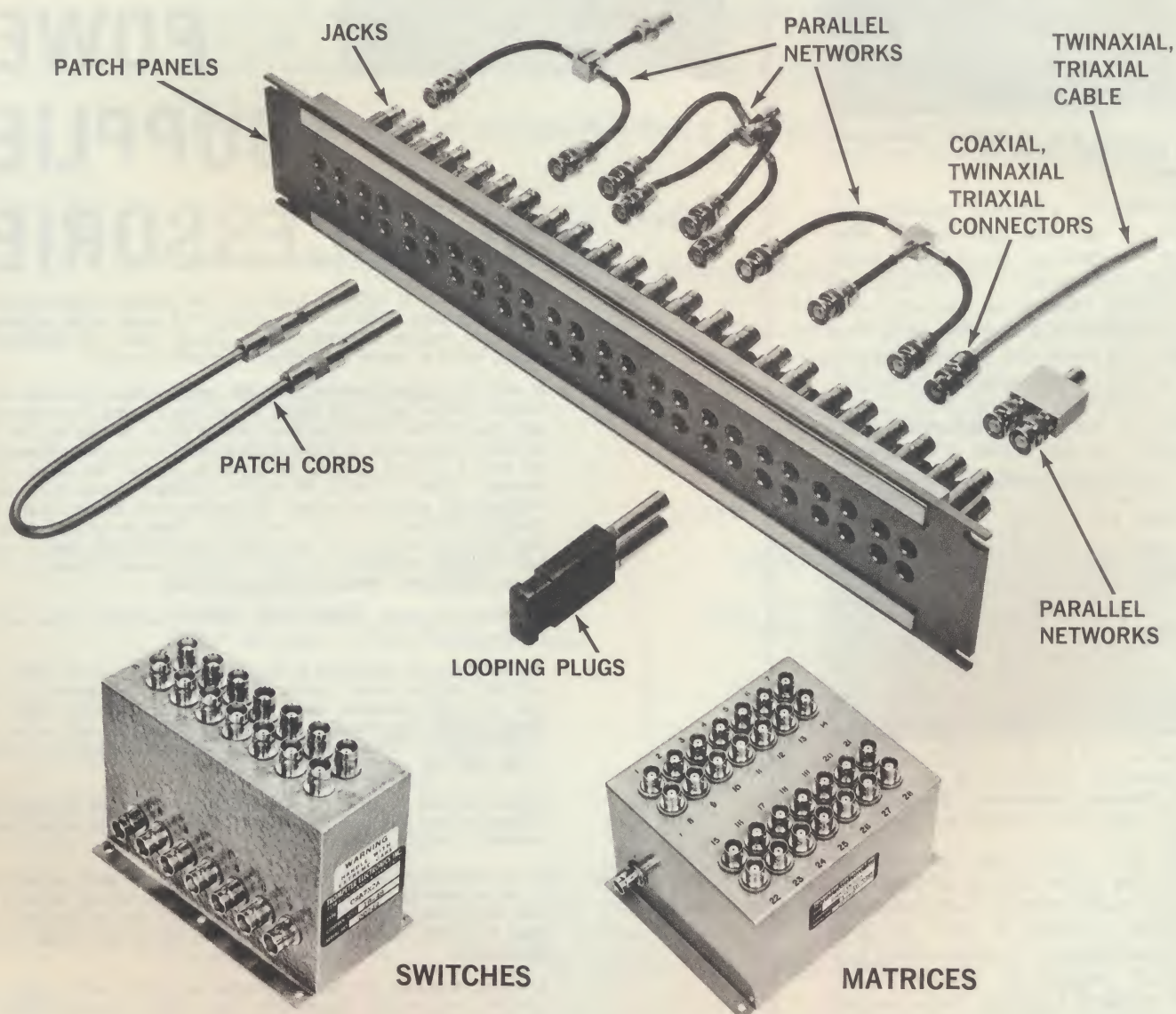
CREATING A NEW WORLD WITH ELECTRONICS

HUGHES

HUGHES AIRCRAFT COMPANY
VACUUM TUBE PRODUCTS DIVISION
Oceanside, California



PLANT — CHATSWORTH, CALIFORNIA

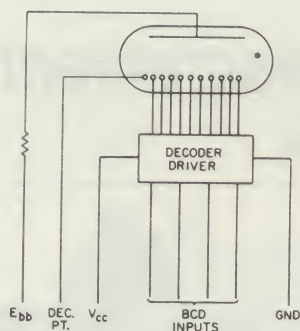
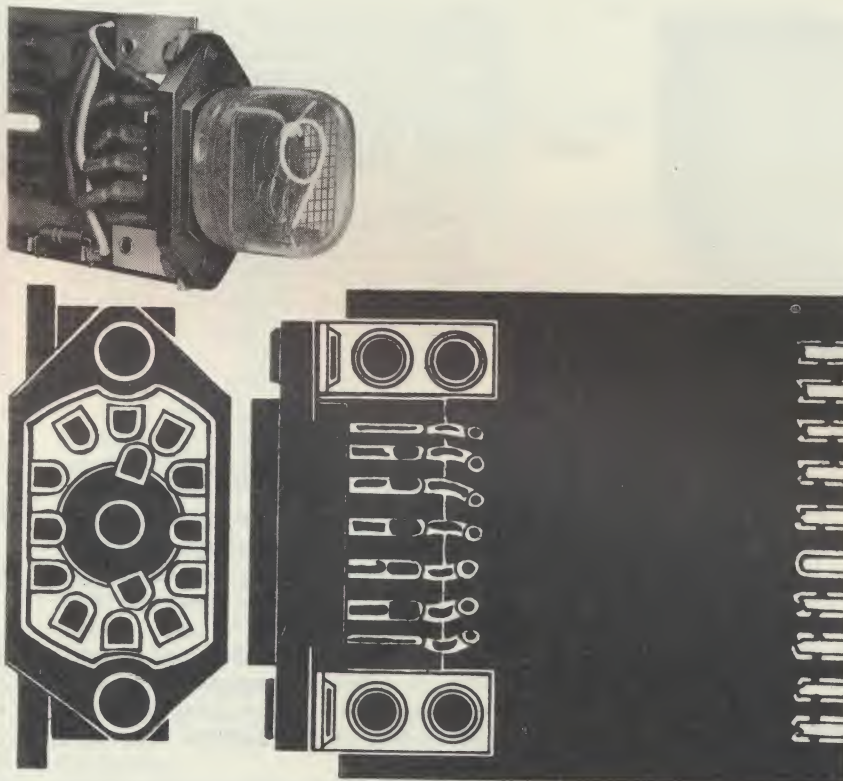


TROMPETER ELECTRONICS, INC.

8936 COMANCHE AVENUE
CHATSWORTH, CALIFORNIA 91311



DIGITUBE[®] DISPLAY TUBE DRIVERS

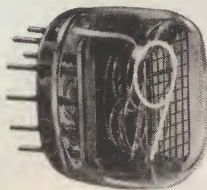


Now available to users of Baird-Atomic's DIGITUBE Display Tubes* are these space-saving, compact DRIVERS. Well-designed and realistically-priced, they will drive a digital display tube directly from low level natural binary coded decimal input, and are adaptable to any size tube — from $\frac{3}{8}$ " to 2" dia. tube bases! All Baird-Atomic DRIVERS utilize TTL monolithic integrated circuits to combine maximum reliability with minimum size!

DIGITUBE DISPLAY TUBE DRIVERS feature:

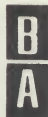
- 15 MHz COUNTING RATE
- COMPATIBLE WITH ALL SIDE VIEW AND END VIEW DIGITAL DISPLAY TUBES
- TTL MONOLITHIC INTEGRATED CIRCUITS
- ADAPTABLE TO ANY SIZE TUBE — $\frac{3}{8}$ " to 2" DIA. TUBE BASES
- BCD INPUTS; OTHER CODES AVAILABLE ON REQUEST

Write or call today for descriptive literature!



DIGITUBE[®] DISPLAY TUBES

Baird-Atomic cold cathode neon glow DIGITUBES provide perfect performance, long-life, and bright digital display in a wide range of character sizes, round or rectangular tube shapes, both end and side viewing! Bulletins also available on request.



BAIRD-ATOMIC

ELECTRONIC PRODUCTS AND COMPONENTS DIVISION

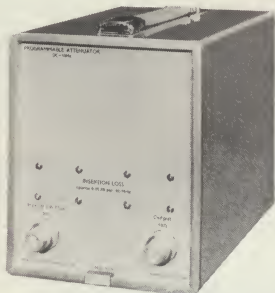
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SALES REPRESENTATIVES AND OFFICES IN ALL MAJOR USA CITIES AND EUROPE

IN THE CENTER



RING



PROGRAMMABLE ATTENUATOR

A new Attenuator is announced by **Marconi Instruments** covering DC to 1GHz. It accepts 1 2 4 8 BCD and has a range of 139db in 1db steps. Accuracy at 1GHz is $\pm 0.5\%$ 0.1db to 120db; at 1GHz is $\pm 1\%$ 0.2db to 100 db. Setting speed is less than 100mSec and at no time during switching is the attenuation less than the initial or final programmed value. Extraordinarily high reliability is achieved since the only moving parts are a number of solenoid-microswitch assemblies having a maximum dis-

placement of 0.015". Intended for incorporation into sophisticated test and communications assemblies Model 2163/1M2 weighs only 12 lbs. and measures 7- $\frac{3}{4}$ " x 5- $\frac{1}{2}$ " x 10- $\frac{1}{2}$ ". **IEEE Booth No. 2D04.**

MAGNETS GET CHARGED

The Model 3260M is a solid state impulse type Magnet Charger capable of magnetizing a wide range of magnet materials and configurations.

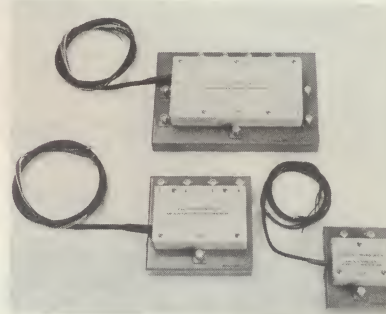
The Model 3260M incorporates an energy storage capacitor bank of 350 Fds. Capacitor emf is variable from 85 to 550 volts, determined by the CHARGING LEVEL control. Incorporation of a POLARITY REVERSING switch allows magnets to be magnetized in either polarity without disconnecting the charging fixture. Polarity reversing also allows the Model 3260M to be used to partially or wholly demagnetize magnetic assemblies. The solid state design of the Model 3260M (no mer-



cury relays or switches) allows the instrument to be operated in any physical position and provides a high degree of reliability. See at **RFL IEEE Booth No. 2A35.**

FOR SYSTEMS USE

Marconi Instruments announces a new range of low VSWR high isolation single pole two- four- and eight-way programmable coaxial switches, DC to 1GHz. Specially designed for routing high frequency signals and for propagation of fast

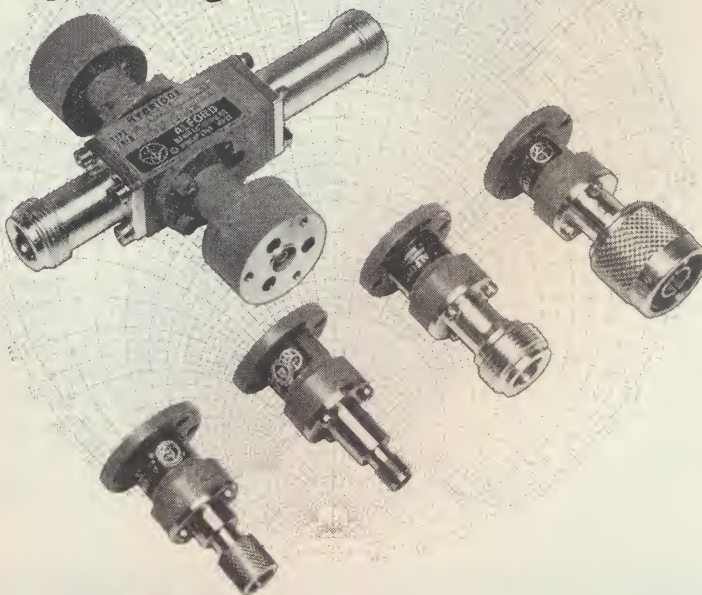


SEE AT THE IEEE BOOTH NO. 2D39

Make Accurate Swept Frequency Measurements from 25KHz to 8GHz

- Up to 46 db Directivity.
- Bandwidths up to 400 to 1.
- High Directivity is maintained with a wide variety of connectors such as Type N, TNC, BNC, SC, C, OSM†, GR900*, APC-7‡.
- Extremely compact. Unit for 25 KHz to 10 MHz Range weighs only 5 lbs. and measures only 7 $\frac{1}{4}$ " x 7 $\frac{3}{4}$ " x 6".
- Low measuring port VSWR.

AMCI RF Bridges can be used as high directivity directional couplers in sweep frequency analysers, reflectometers and automatic plotters. Since the side port terminations need only be matched to each other and not to 50 ohms to provide high directivity, these Bridges are also well suited for use as balanced mixers, balanced modulators, isolated power dividers, etc.



† Registered Trademark of Omni Spectra, Inc.

* Registered Trademark of General Radio Company

‡ Registered Trademark of Amphenol Corporation



ALFORD

Manufacturing Company

120 Cross St., Winchester (Greater Boston), Mass. 01890

Tel: (617) 729-8050

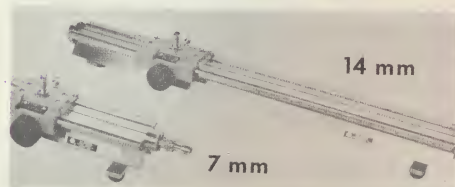
TWX: (710) 348-1063

Cable: AMCIBOS

rise time pulses, this new range of switches offers power handling of 10 watts and up to 250 volts peak. Switching is performed by dry-reed relays mounted in strip line configuration. Isolation figures are typically 95db at 10MHz, 80db at 30MHz, 75db at 100MHz and 55db at 1GHz, life expectancy 10^7 closures minimum. **Booth No. 2D04.**

AMCI 7MM AND 14MM SLOTTED LINES

The **AMCI** Type 2920 and 2382 slotted lines are high precision co-

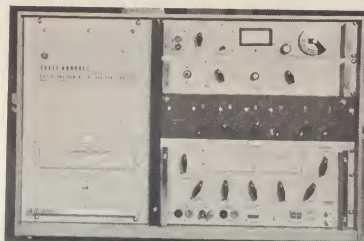


axial measuring devices that can be used for measurements in a wide variety of connectors. The load end of the Type 2920 (7mm) Slotted Line is equipped with an **AMCI** Type CA-45 Precision Connector. The load end of the Type 2382 Slotted Line (14mm) may be equipped with either an **AMCI** Type CA-46 Precision Connector or with a connector that mates with the GR Type 900 (**AMCI** Type CA-47) but uses compensated dielectric pins instead of a bead to support the inner conductor. The **AMCI** Types CA-46 and CA-47 Precision Connectors may be interchanged when desired. Measurements are made in various line sizes by attaching the desired output reducer directly to the slotted line with three convenient screws. Rugged construction and excellent stability make the Type 2920 and 2382 Slotted Lines

particularly suited for standards applications and for measurements of low SWR's. **IEEE Booth No. 2D39**

SOLID STATE INSTRUMENT CALIBRATION STANDARD

RFL announces a new Model 300 AC-DC Calibration Standard. This all solid state calibrator is significantly unique and differs from any other calibrator in that it offers the widest range of AC-DC current, voltage, power and frequency output. Some features include high accuracy and a unique arrangement of go-no-go logic circuitry which protects against misoperation.



Additional advantages of the Model Three Hundred are automatic operation which senses the dialed quantity and automatically corrects for any deviation without the necessity of operator check and adjustment. The output deviation control facilitates direct percentage calibration for more accurate and rapid operation.

There is an initial cost advantage since the purchase price includes almost a complete calibration facility without the addition of accessory units. See the Model 300 at **IEEE Booth No. 2A35.**

AUDIO FLUTTER METER

The Model 8100 Flutter Meter is widely used on production lines and

in the laboratories of leading manufacturers. It measures precisely to both NAB (National Association of Broadcasters) and DIN (Deutsche Industrie Normen) standards. Both drift and flutter are independently indicated on large, accurate meters.

Test Frequency: $3.0 \text{ kHz} \pm 10\%$
Flutter Bandwidth:

.2 to 200 Hz unweighted
.2 to 200 Hz NAB or DIN weighted

Drift Ranges: $\pm .03\%$, $\pm 1\%$, $\pm 3\%$, $\pm 10\%$ full scale.

Flutter Ranges: $.01\%$, $.03\%$, $.1\%$, $.3\%$, 1% , 3% and 10% full scale.

Indication is \pm peak or rms.

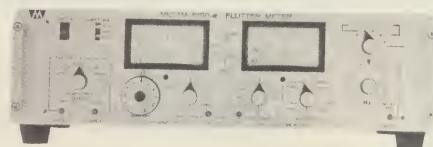
Accuracy on all Ranges:
 $\pm 2\%$ at demodulator output
 $\pm 5\%$ full scale meter indication

Input Levels: 5 mv to 5 V rms. accepted in two ranges.

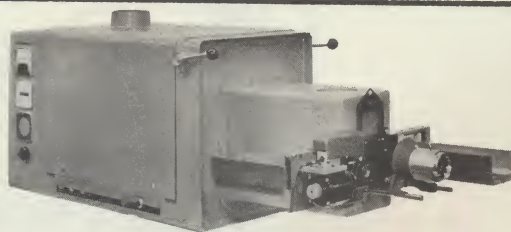
AGC and Limiting: Accommodates -20dB dropouts plus a 40dB dynamic range.

Automatic indication of under or over range input.

The **MICOM** Model 8100 can accurately measure flutter to the 5 ppm level.



The Model 8100-W includes a wave analyzer tuneable from 0.5Hz to 600Hz in 3 overlapping ranges. The wave analyzer is an invaluable diagnostic tool in locating the particular mechanical components contributing to excessive flutter.



XENON SLIDE PROJECTOR FOR FRONT AND REAR SCREEN PROJECTION

Description: Xenon illuminator for slide projection using a Telepro 6000 slide changer and a 2500 watt xenon short arc lamp.

Hughes Electronics Company model XTL2500TS illuminator with a model 2500R35T power supply.

Slide Size: ASA standard $3\frac{1}{4} \times 4$ slides with an aperture up to $2\frac{3}{4} \times 3\frac{1}{2}$.

Illumination: Minimum of 15,000 lumens open aperture at a color temperature of 6000°K. Field uniformity within 80%.

Illuminator Size: Height 25 inches
Width 21 inches
Length with changer 63 inches

Power Supply: A DC (direct current) power supply for converting AC line power to DC for operation of the xenon lamp. The power supply can be installed remotely from the illuminator.

Power Supply Input: 208/230/416/460 volts
@ 18/16/9/8 amperes, 30.

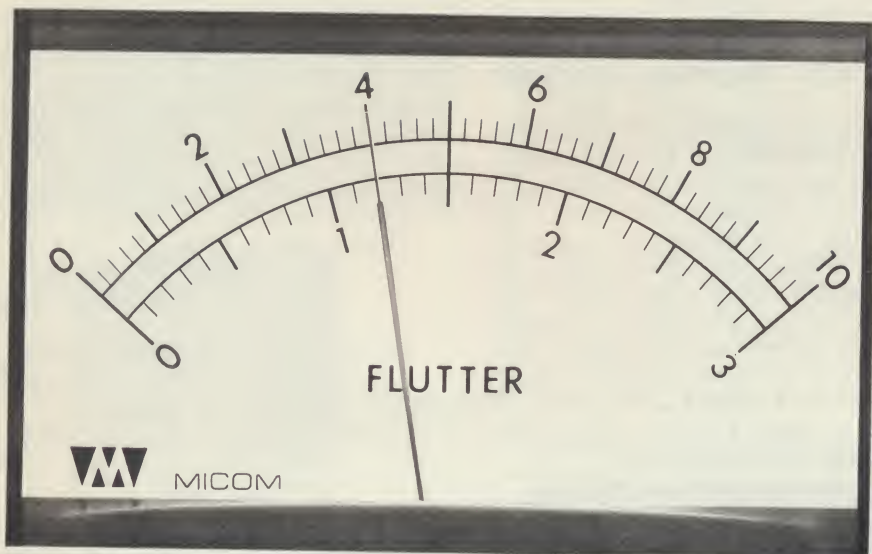
Power Supply Size: Height 32 inches
Width 21 inches
Depth 12 inches

Sound Level: Maximum of 55db.
Ask for Bulletin X-65

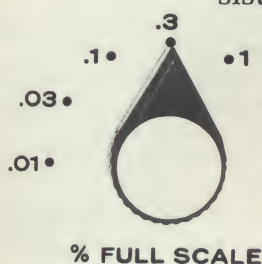
"The XTL System by Hughes".

**HUGHES
ELECTRONICS
COMPANY**

5271 W. Jefferson Boulevard, Los Angeles, Calif.

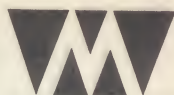


If someone made a flutter meter that was consistently accurate to $\pm 2\%$ on all ranges, that displayed meter readout for both drift and flutter, that measured to NAB and DIN or IRIG standards, that was automatically self-calibrating, and that required no set-up time, could you use it?



These instruments accurately measure the amount of flutter in both audio and data recording equipment, consistently delivering the highest precision ever obtained in flutter measurement. Advanced solid state circuitry allows meter read-out for both drift and flutter, eliminating subjective analysis of scope traces.

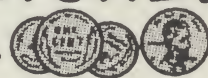
The MICOM meters were designed as laboratory instruments, but are so simple to use that they are highly efficient on production lines. The meters are self-calibrating and require no warm-up period or calibration adjustments for accuracy. They also serve as precision FM detectors of unusual sensitivity and bandwidth for other applications.



MICOM

855 Commercial Street
Palo Alto, California 94303

THE PENNY ARCADE



The following instruments are being offered for sale with standard new equipment warranties. Equipment may be slightly used or may have been superseded by a later model. Complete data will be furnished upon request.

● RFL INDUSTRIES, INC.

Model 2470 Magnet Charger Variable Output Voltage with high capacity energy storage 225 joules. Demonstrators five available. Original price \$1195. Sale price \$795.

● MARCONI INSTRUMENTS

Model 1370 RC Oscillator, 10 Hz to 10MHz sine, 10Hz to 100 KHz square, outputs up to 31.6V r.m.s., impedances 75, 100, and 600. Original price \$770. Sale Price \$495.

● MARCONI INSTRUMENTS

Model 2330 Wave Analyzer, 20Hz to 50KHz, 6 Hz bandwidth, tracked BFO output. Solid state. Original price \$1895. Sale Price \$1275.

● MARCONI INSTRUMENTS

Model 2331 Distortion Analyzer, 20Hz to 20KHz, measures components to 100KHz. Distortion and noise to 0.1 % full scale solid state. Original Price \$795. Sale Price \$595.

● MARCONI INSTRUMENTS

Model 2333 Transmission Measuring Set, 50Hz to 560KHz contains solid state oscillator, monitored attenuator and level meter. Original Price \$1125. Sale Price \$695.

● MARCONI INSTRUMENTS

Model 2334 Tuneable Notch Filter, 20Hz to 20KHz, suppresses unwanted frequency to -80db, use to extend dynamic range of wave analyzer. Original Price \$495. Sale Price \$395.

● BAIRD-ATOMIC INC.

KT-1 Portable Beta hie, Ico Tester, Emitter current 10 MA, Collector voltage 7.5 volts. Demonstrator one only. Original Price \$395. Sales Price \$200.

● BAIRD-ATOMIC INC.

Model KP-3 "h" Parameter Transistor Test Set, current 10 MA to 1 amp, collector voltage 100 volts. Demonstrator one only. Original Price \$1059. Sales Price \$550.

THIS MONTH'S RINGMASTER



This month's Ringmaster is **Keith Elkins**, Assistant Sales Manager of **Marconi Instruments**, Englewood, New Jersey.

Many of us had the pleasure of getting to know **Keith** and he has become quite a familiar figure in the electronics industry during his six years with **Marconi Instruments** in the U.S.A. **Keith** travels extensively maintaining contact with some sixty sales representatives and visits customers throughout the country. **Keith** was educated at **Bournemouth School** and **Jesus College, Oxford**, and holds an **Honors Degree in Physics**. Following graduation, **Keith** received two years special training including production engineering and management at **Hatfield College** and further training at **Marconi College**.

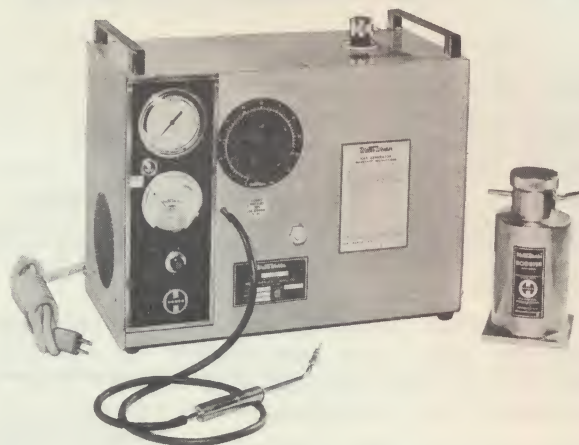


Keith Elkins

Prior to joining **Marconi Instruments** in St. Albans, England, **Keith** served as a Signal Officer in the **Royal Corps of Signal**, General Headquarters, British Forces in the Mediterranean.

He joined the Company in January, 1958 and came to the United States in 1961 in his present capacity.

Home nowadays for **Keith** and his charming wife **Pat** is Greenwich Village, but if they are not to be found at home, it could easily be that they are skiing or sailing, both hobbies enjoyed by the **Elkins'** family.

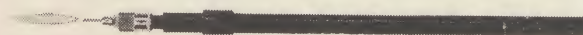


The famous Henes
Oxy-Hydrogen Flame Generator.

Henes Oxy-Hydrogen Flame Generators make tough jobs easy—for an operating cost of less than 2¢ per hour! These ideal production and lab tools generate their own gas by dissociating distilled water to provide you with a precise, economical heat source of 6000°F.

ALMOST LIMITLESS APPLICATIONS. Now improved for even greater convenience and economy, the Henes Flame Generator can: ■ weld resistance wire to copper ■ butt-weld the finest wires ■ braze contacts to relay blades ■ fuse tungsten to nickel ■ solder relay cans to headers ■ strip wires of Teflon, nylon, or ceramic insulation ■ anneal spring wires and blades ■ drill holes in quartz, ceramic, tungsten, glass ■ weld chromel and alumel wires ■ solder broken welds in electronic modules ■ fuse glass and quartz parts ■ polish glass, quartz, ceramics ■ solder coaxial connectors. (Your own needs will suggest other applications.)

WELD SOLDER BRAZE for less than... 2¢ per hr.



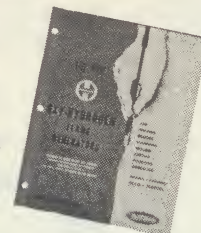
Precision flame adjusts from .003" to .042" in diameter and from .01" to 6" long.

As well as:

- DRILL ■ CUT
- POLISH ■ ANNEAL

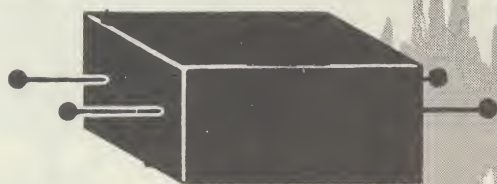
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FREE! Send for the new brochure which tells the complete story of Henes Oxy-Hydrogen Flame Generators. Five models available from \$250 to \$725 FOB Phoenix, Ariz.

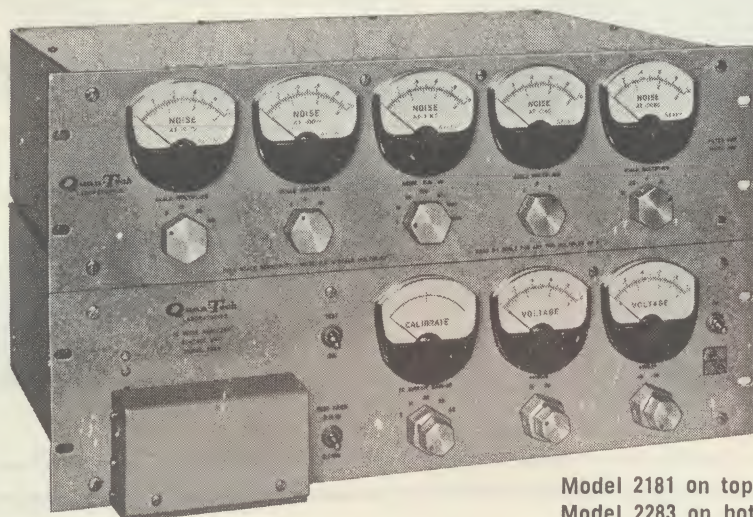


HENES MANUFACTURING CO.
4301 E. Madison St., Phoenix, Ariz. 85034, Ph. 602/275-4126

SEE AT THE IEEE BOOTH NO. 2D47



HOW MUCH NOISE IN A BLACK BOX?



Model 2181 on top.
Model 2283 on bottom.

Now you can measure noise
in Linear IC's, Operational
Amplifiers, and other
"Black Boxes"
SIMPLY,
RAPIDLY, and
EFFICIENTLY with

Quan-Tech's new

**Model 2283-2181
Integrated Circuit
Noise Analyzer**

Perhaps we should have called this instrument a Black Box Noise Analyzer — it's that versatile. Basically, it will measure anything from the thermal noise of a 10K ohm resistor up to a complete amplifier with 50db or more gain, or any combination of things in between. The Model 2283 Control Unit consists of a pair of extremely low-noise power supplies, one plus and one minus, each independently variable from zero to 30 volts at 100 milliamperes for biasing IC's and Op Amps. Included in the control unit is an amplifier having a voltage gain of 10,000 and a bandwidth of 5Hz to 125KHz. A 50db variable-plus-step attenuator compensates for the gain of the device under test, and a 1KHz calibrating signal is provided for standardizing overall gain.

Printed circuit cards that plug into the test jig provide almost unlimited versatility in the types of devices that can be tested. We have available standard cards with test sockets for the more commonly used linear IC's, or we'll design and build one for your pet devices, whether they be zener diodes, FET's, bi-polars or what. If you're the do-it-yourself type, be our guest and make your own.

The Model 2181 Filter Unit, when used with the Control Unit, permits noise measurements to be made at five frequencies simultaneously from 10Hz to 100KHz. If you don't need the simplicity and multiple frequency readout of the Model 2181, the Model 2283 Control Unit can be used with a wave analyzer to measure noise. Naturally, we recommend either our Model 303, 304, or 305, which have bandwidths and time constants especially suited for noise measurements. Whatever your requirements, this instrument can solve many noise measuring problems in connection with the new devices now becoming available.

Price: Model 2283 Control Unit \$1450.
Model 2181 Filter Unit \$2500.

— Quan-Tech LABORATORIES, INC. —

10

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Booth No. 2A35 - 2A39

NEW Model 300 AC/DC Instrument Calibration Standard. **NEW** Model 3265 Gaussmeter and **NEW** Model 3260 Solid-State Magnet Charger. Also on exhibit will be a complete line of calibration magnet charging equipment and gaussmeters.

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NEW Programmable DC to 1GHz Attenuator, **NEW** Programmable Two - Four - and Eight-way single pole coaxial switches with low VSWR and high isolation DC to 1GHz. Solid state wide range FM/AM Modulation Meter, 2700 channel Noise Loading Test Set, solid state HF Signal Generator, FM/AM Signal Generators, FM Deviation Meters, Two-tone Test Generator. Video Sweep Generator with differential probes, 0.1% L.C.R. Bridge and Q Meters.

QUAN-TECH LABS., INC.

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Booth No. 2D47 - 2D49

NEW Model 2283-2181 Integrated Circuit Noise Analyzer for measuring noise in linear integrated circuits, operational amplifiers, and similar devices. **NEW** Model 305 Wave and Spectrum Analyzer, frequency range 10 Hz - 50 KHz, bandwidths 10, 100, 1000 Hz, containing several new and useful features. **NEW** High Frequency Plug-in Heads for Model 340 RF Transistor Noise Analyzer.

HUGHES AIRCRAFT CO.

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Booth No. 3A48 - 3A49

NEW HPS-100 Integrated Circuit Place and Solder System. **NEW** HXY-510 Automated Welding/Soldering N.C. Control System. **NEW** LSS-1000 Lead Sealing System. **NEW** HAC-2 AC Welding Power Supply and a complete **NEW** family of DC solid-state power supplies; range in 50, 100, 250, and 1000 watt seconds.

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NEW Series 5050 Proximity Voltmeters. Measures voltage from 1 volt to 3000 volts full scale without physical contact. Dynamic Capacitor Electrometers. Including 475 Series Femtometers and 474 Series Picometers. Series 1000 Picoammeters. Also, accessories, including Ionization Chambers, Bucking Current Generators, and Current Calibrators will be on exhibit.

ALFORD MANUFACTURING CO.

Winchester, Mass.

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NEW 3.5 mm Slotted Line, 2.5 GHz to 36 GHz and a **NEW** series of adapters for this line. **NEW** unequal power divider hybrid with high isolation and **NEW** "C" band impedance plotter and accessories. Also on display will be the complete line of impedance plotters, slotted lines, adapters and hybrid couplers.

